

What is claimed is:

1. A method of manufacturing a polyurethane composite material comprising the steps of:

forming a non-polar material into a predetermined shape;

5 preparing a bonding surface of said non-polar material by plasma treating said bonding surface;

positioning said non-polar material in a mold;

disposing liquid precursors of polyurethane into a cavity of said mold such that said liquid precursor of polyurethane is in contact with said bonding surface of said non-
10 polar material; and

curing said liquid precursor of polyurethane to form a polyurethane material;

wherein said non-polar material and said polyurethane are effectively joined at said bonding surface of said non-polar material to form said polyurethane composite material.

15 2. The method as claimed in claim 1 wherein said step of preparing a bonding surface of said non-polar material comprises the steps of:

disposing said non-polar material between two electrodes in a vacuum chamber;

sealing said vacuum chamber;

20 discharging a plasma between said electrodes such that said bonding surface of said non-polar material is sufficiently modified to allow bonding of said polyurethane; and

removing said non-polar material from said vacuum chamber.

3. The method as claimed in claim 2 further comprising the steps of;
removing ambient air from said vacuum chamber; and
disposing a predetermined gas within said vacuum chamber before discharging
said plasma.

5 4. The method as claimed in claim 1 wherein said non-polar material is ultra high
molecular weight polyethylene.

5. The method as claimed in claim 1 further comprising the step of disposing a
metallic material in a predetermined position in said mold, before said step disposing said
liquid precursor of polyurethane in said mold, such that polyurethane effectively joins
10 said non-polar material and said metallic material.

6. The method as claimed in claim 5 wherein said step of preparing a bonding
surface of said non-polar material comprises the steps of:

disposing said non-polar material between two electrodes in a vacuum chamber;
sealing said vacuum chamber;

15 discharging a plasma between said electrodes such that said bonding surface of
said non-polar material is sufficiently modified to allow bonding of said polyurethane;
and

removing said non-polar material from said vacuum chamber.

7. The method as claimed in claim 6 further comprising the steps of;
20 removing ambient air from said vacuum chamber; and
disposing a predetermined gas within said vacuum chamber before discharging
said plasma.

8. The method as claimed in claim 5 wherein said non-polar material is ultra high molecular weight polyethylene.

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